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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,766	12/09/2003	Reid Edmund Tatge	TI-35556	4307
23494 7590 10/06/2009 TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265				
EXAMINER				
WANG, BEN C				
ART UNIT		PAPER NUMBER		
2192				
NOTIFICATION DATE		DELIVERY MODE		
10/06/2009		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com

Office Action Summary

Application No.

10/731,766

Applicant(s)

TATGE ET AL.

Examiner

BEN C. WANG

Art Unit

2192

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date: _____

DETAILED ACTION

1. Applicant's amendments dated May 29, 2009, responding to the Final Office action mailed April 3, 2009 provided in the rejection of claims 19 and 20.

Claims 19 and 20 remain pending in the application and which have been fully considered by the examiner.

Applicant's arguments with respect to claims have been fully considered but are moot in view of the new grounds of rejection – see *Srivastava et al.* - art made of record, as applied hereto.

Withdrawal of Finality

2. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections – 35 USC § 103(a)

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (Pub. No. US 2004/0064809 A1) (hereinafter 'Liu') in view of Amitabh Srivastava et al. (Pat. No. 5,966,539) (hereinafter 'Srivastava' - art made of record)

5. **As to claim 19** (Previously Presented), Liu discloses a method of code generation comprising the steps of:

- compiling a source code thereby generating an object file comprising object code and intermediate code (e.g., Fig. 1, elements 104 – Source Program; 112 – Source File; 106 – Compiler 106; [0024] - ... The compiler 106 is configured to translate source files 112 of the source program 104 into intermediate object and object files ... ; Fig. 3, block 302 – Compiler Translates Source File(s) into Intermediate Objects);
- optimizing the intermediate code into optimized intermediate code (e.g., Fig. 2, element 102 – Translator/Optimizer; Fig. 3, block 308 – Linker returns Intermediate Objects to Compiler; Fig. 4C, block 432 – Compiler Performs any Optimizations available in view of Information provided by the Linker; Fig. 5, block 506 – Compiling the Program with the Compiler in view of the Gathered Information so as to Optimize the Program; [0008] – [0014]) ; and

linking the object file including

- receiving the object file including object code and intermediate code (e.g., Fig. 3, blocks 312 – Compiler Generates Real Objects; 314 – Real Objects

linked together by Linker; Fig. 4B, block 416 – Real and Intermediate Objects provide to Linker); and

- o producing executable code from the object file including object code and optimized intermediate code (e.g., [0049] - ... the real objects are linked together by the linker 108 to produce an executable program as indicated in block 314)

Further, Liu discloses translating source objects of the program into intermediate objects using a compiler, providing the intermediate objects to a link, analyzing portions of the program about which the compiler has no knowledge using the linker, updating a global symbol table with information contained in the linker global symbol table to the compiler, and translating the intermediate objects into real objects with the compiler in reference to the information contained in the linker global symbol table so as to optimize the program (e.g., [0010]) but does not explicitly disclose other limitations stated below.

However, in an analogous art of Link Time Optimization with Translation to Intermediate Program and Following Optimization Techniques including Program Analysis Code Motion Live Variable Set Generation Order Analysis, Dead Code Elimination and Load Invariant Analysis, Srivastava discloses:

- providing intermediate code to be optimized (e.g., Fig. 3, elements 50 – optimizing linker; 56 – Performance Enhancer; Col. 5, Lines 33-42 - ... the preferred embodiment of the optimizing link 50 is given. During an initial phase of the linker 50, the translator 51 converts the object modules 41-43 and any selected module of the library 49 to the linked modules 52 in an

intermediate language form ...; Col. 5, Lines 63-66; Col. 6, Lines 49-67 - ...

These execution control structures are used during the subsequent analyzing and optimizing phase ... The linked module 52 reveals optimization opportunities ...; Col. 7, Lines 8-18 - ... the link-time optimizer detects execution loops which span object modules. Such execution loops go undetected by traditional compiler); and

- receiving optimized intermediate code (e.g., Col. 9, Lines 59-65 - ... the modification of the RTL linked code 52 for optimization purposes is performed during the next phase of optimizing linker 50 by the optimizer 56. Specific examples of optimization which will be described are loop invariant code motion, and inter-procedure "dead code" elimination)

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to combine the teachings of Srivastava into the Liu's system to further provide other limitations stated above in the Liu system.

The motivation is that it would further enhance the Liu's system by taking, advancing and/or incorporating the Srivastava's system which offers significant advantages that at link-time the entire program, including library modules is available. Thus, the entire program can be scrutinized for optimization opportunities, rather than isolated opportunities just within single and separate compiled source code modules; These link-time properties can lead to several advantages which are exploited by the invention to optimize the executable code to a level not previously achievable by compiler as once suggested by Srivastava (e.g., Col. 2, Lines 26-43)

6. **As to claim 20** (Previously Presented) (incorporating the rejection in claim 19), Srivastava discloses the method of code generation wherein:

- said step of providing intermediate code to be optimized provides only portions of the intermediate code (e.g., Col. 13, Lines 30-36 – the liveliness analysis of the optimizing linker 50 is substantially more precise than any analysis which could be performed by a traditional compiler 30. The optimizing linker 50 considers the entire program 20 ... The link-time optimizer 50 can identify available registers which go unnoticed by the compiler; Lines 44-51 - ... Clean-up removes common sub-expression, inter-procedural dead code, redundant instructions which save and restore variables, temporary register-to-register copy instructions, and any duplicate code portion of invariant code which were moved to the same area from different locations)

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben C. Wang whose telephone number is 571-270-1240. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on 571-272-3695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ben C Wang/
Ben C. Wang
Examiner, Art Unit 2192

/Tuan Q. Dam/
Supervisory Patent Examiner, Art Unit 2192